

ABSTRACT

THESIS: Mechanisms of Hypertrophy after 12-weeks of Aerobic Training in Elderly Women

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The primary focus of this study was to determine basal levels of myogenic (MRF4, myogenin, MyoD), proteolytic (FOXO3A, atrogin-1, MuRF-1), myostatin, and mitochondrial (PGC-1 α & Tfam) mRNA in elderly women before and after aerobic training. This approach was taken to gain insight into the molecular adaptations associated with our observed increases in whole muscle cross sectional area (CSA) (11%, $p < 0.05$), knee extensor muscle function (25%, $p < 0.05$) and aerobic capacity (30%, $p < 0.05$) with training. Nine elderly women (71 ± 2 y) underwent muscle biopsies obtained from the vastus lateralis before and after 12-weeks of aerobic training on a cycle ergometer. Post training biopsy samples were acquired 48 hours after the last exercise session. Aerobic training reduced ($p < 0.05$) resting levels of MRF4 by 25% while myogenin showed a trend to decrease ($p = 0.09$) after training. FOXO3A expression was 27% lower ($p < 0.05$) while atrogin-1 and MuRF-1 were unaltered after training. Additionally, myostatin gene expression was decreased ($p < 0.05$) by 57% after training. Lastly, aerobic training did not alter PGC-1 α or Tfam mRNA. These findings suggest that aerobic training alters basal transcript levels of growth

related genes in skeletal muscle of older women. Further, the reductions in FOXO3A and myostatin indicate the aerobic training induced muscle hypertrophy in older women may be due to alterations in proteolytic machinery.